How to write a dissertation

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(slides mainly due to Ted Briscoe and Neil Dodgson)
How to write a dissertation
WHAT is the dissertation?

• A document of about 10,000 words
• … describing your project
• … in a carefully prescribed format
• … worth a quarter of your final mark
• Due 12 noon on Friday 13 May 2016
• Vivas on Friday 10 June 2016
Length

• Maximum of 12,000 words
  – Including main text, tables, footnotes
  – Excluding appendices, bibliography, photographs, diagrams

• Aim for 10,000 words

• Probably the biggest formal document you’ve written
Reactions to the word limit

A. 10,000 words – yeah, OK.

B. 10,000 words! – I’ll never be able to write that much!

C. 10,000 words?!! – I’ll never be able to fit it into 12,000 words, let alone 10,000!

Pascal (1656) “I would have written a shorter letter, but I did not have the time.”
Advice for terse writers

• It would be very hard to describe a Part II project properly in under 7,000 words
• So write your 7,000 words as best as you can
• Then see how you can improve your core by adding more words
  – Longer explanation of the key algorithms?
  – More results?
  – More detailed analysis of the results?
Advice for verbose writers (1)

• The best project write-ups fit nicely within the 12,000 word limit, rather than feeling squashed
• What are the key points you need to cover to get the marks? – cover these
• What are the fascinating but largely irrelevant side issues? – drop these
• It is especially easy to write too much in the Introduction and Preparation chapters
Advice for verbose writers (II)

• You do not have to explain every function you wrote, every data structure you use, every book you read, and every interesting idea for extensions that you had

• If all else fails, write too much and then ruthlessly cut it down, preferably with help from your Supervisor (and/or Director of Studies)
Advice for all

• What are the key points?
  – make sure you cover these
  – some ideas for key points:
    • what did you set out to do?
    • what did you actually do?
    • how did you do it?
    • what were the results?
    • how good were the results?

• Always remember who your readers are
  – In this case they are three examiners!
It’s not a diary

• it is a report not a diary
• don’t write it in the order you did it
• write it in the order that will make most sense to the reader
Over 3000 dissertations so far

Every Part II student has had to write a dissertation.

Why not visit the library and leaf through a few?
WHY?

- You will write many reports in your professional life, this is good practice
- You will be judged on the dissertation, not directly on your program
- You need to present your work as well as possible
- It is worth a good proportion of your final mark
When?

• Finish programming, testing and results-gathering by end of Lent Term at latest
• Finish complete draft before Easter Term starts
• Give to supervisor and Director of Studies to read
• Correct and submit 2 weeks before deadline
  – Deadline: 12 noon, Friday 13 May 2016
Penalty

• If you submit past the deadline, you will be docked 25% of the mark
  – with a further 5% of your mark docked for each subsequent day late

• This isn’t an idle threat – we do it
  – even if you are just one minute late
WHO are you writing for?

• Three Computer Science lecturers
  – You may assume that they are intelligent
  – They know a lot of computer science
    • so they are not ignorant
  – They do not know the detailed area of your project
    • so you need to tell them about it
    • treat them as having just finished Part IB
  – They prefer good writing
  – They will read your dissertation fairly quickly
They read quickly?

• Each examiner has to read 50 Part II dissertations in 2 weeks

• I can read 15,000 words/hour
  – if it’s interesting!

• So expect the examiner to spend between $\frac{3}{4}$ hour & 1½ hours on your dissertation
Important corollaries of this

• Be clear, be concise, tell them what you want them to know, do not expect them to realise how clever you are by osmosis

• Say things up front, don’t hide interesting stuff, you are not a mystery writer or a magician

• Do not expect them to plough through pages of boring gory detail

• Do not use code extracts when prose will do a better job
Provide signposts

- Your reader needs to know why they should bother to read each bit of the dissertation
- You should tell the reader
  - Where you are going
  - Why you are going there
  - How you are going to get there
Say everything three times

– Give an overview of what you are going to say
– Say it
– Summarise what you’ve said

• This applies
  – To whole dissertation
    • Ch. 1, Ch. 2–4, Ch. 5
  – (Recursively) To each chapter
    • introduction, content, summary
  – (Recursively) To each section in a chapter
WHO should proof-read it?

- Supervisor
  - obviously
- Director of Studies
  - if he/she has time
- Friends
  - provided they aren’t also overloaded with work
Allow sufficient time

• Your supervisor and Director of Studies are busy people so:
  – Allow them enough time to read and comment (say 2 weeks) so they can fit it around their other commitments
  – Use them wisely – do not give them a draft that you haven’t checked yourself
  – Do not assume they’ll read more than one draft
  – **NEVER** give them a second draft if you haven’t incorporated their corrections from the first draft!
Tools

– Microsoft Word
– \LaTeX
– your own favourite word processor

• whichever tool you use:
  – set up a template of the whole dissertation straight away
  – ensure that you can include figures, photos, equations, etc (whatever you need)
  – ensure that you can print it
  – find somewhere to get it bound
Microsoft Word

• learn to use styles (Format menu)
  • they will help you keep your typesetting consistent (e.g. all second level headings in the same typestyle)
  • make it easy to get section numbers automatically and correctly

• difficult to typeset large amounts of mathematics efficiently

• including figures neatly is often a challenge
  • easy to include figures in a clunky way
\LaTeX

- similar to a programming language
- gets all the typesetting right for you automatically
- easy to handle equations & tables – but don’t confuse $\text{different}$ and \texttt{\emph{different}}.
- including figures works well, once you know how to get it to work

- Martin Richards has provided a collection of files that constitute the basis of a \LaTeX dissertation: www.cl.cam.ac.uk/~mr/demodiss.tar
Structure – five chapters

1. Introduction: 2–3 pages
2. Preparation
3. Implementation
4. Evaluation
5. Conclusion: 1–2 pages
   – see the pink book for details of what should go into each of the five chapters
   www.cl.cam.ac.uk/teaching/projects/pinkbook.pdf
Mark allocation

• the pink book tells you how marks are allocated and what the examiners want to see
  – Introduction & Preparation 26%
  – Implementation 40%
  – Evaluation & Conclusion 20%
  – Presentation 14%

• It’s a good idea to make your word budget for each section approximate the mark budget.
I. Introduction

• Make it clear in the first paragraph what your project is about & how well you’ve done it
  – e.g. “My project concerns the creation of a new operating system. My OS is based on quantum uncertainty. I have successfully implemented the heart of the new OS, which I have demonstrated running a range of key operations. This implementation fulfils the requirements of my core project proposal and one proposed extension: recovering deleted files through a time-warp mechanism.”
2. Preparation

• “work done before code was written”
• show evidence of planning
• show evidence of good software practice
• explain any background

• the nature of this chapter will vary greatly between dissertations
3. Implementation

• What level of detail?
  – Too little detail
    • “I wrote a class which implemented public key cryptography using the new BWR algorithm.”
      – you need to tell the reader something about how you implemented this clever algorithm
  – Too much detail
    • “My BWR cryptography class contains six methods. The first method is called X, it has four parameters called A, B, C and D and returns an E. Parameter A is of type F, it indicates to method X exactly how many…”
      – but not so much detail that they lose the will to live
4. Evaluation

• Many projects fall down on evaluation
• You may have the most fantastic implementation ever, but you still need to evaluate it
• Allow 2 weeks for evaluation:
  – to get results
  – to analyse results
  – to get screen shots, output logs, photos, if appropriate
5. Conclusion

• Make it clear in the first paragraph what your project was about, and how well you’ve done it.

• Also say what you’d do differently if you did it again
Presentation: 14% of the marks

• primarily for being literate and tidy
• no need to spend hours on advanced graphic design or page layout
• but you do need to ensure that:
  – it is spell-checked (en_GB is fine, en_US is OK, but inconsistent mixtures look sloppy)
  – grammar is reasonable
Language tips

- Don’t use “don’t” and the like – including “it’s”.
- “I” for things you’ve done, “we” is OK for “the reader and I”. Passive voice is OK, but can be clumsy.
- Hyphenate compound adjectives: “light blue ball”, “high-level language”, “a model-checking algorithm”.
- Avoid doubt and convoluted sentences: “I planned to aim at the possibility of constructing…” Be definite, be judgemental.
- Plain English is good, e.g. http://www.plainenglish.co.uk/campaigning/examples/before-and-after.html
- More hints: www.cl.cam.ac.uk/~pr10/teaching/dissertation.html
Final words

• read the pink book
  – it tells you what you need to write
• prepare a complete template before starting to write
• ensure that you know how you’ll get it printed & bound
• write clearly at an appropriate level of detail
• aim to submit 2–3 weeks early
• read the pink book
  – again, in case you missed something